

ABSTRACT

Partial oxidation of hydrocarbons to produce hydrogen and carbon monoxide is carried out by a cyclical process, which includes (a) contacting an oxygen ion conducting ceramic with air at a pressure between about 1 and 50 bara in a reactor, wherein oxygen from the air reacts with the ceramic, thereby producing an oxygen-enriched ceramic, and (b) contacting the hot, oxygen-enriched ceramic with hydrocarbon gas and optionally steam in the reactor. During the partial oxidation reaction phase of the process, the oxygen-enriched ceramic reacts with the hydrocarbon, thereby producing the desired gas products and regenerating the oxygen ion conducting ceramic for the next cycle of the process.